# Hazard Control Plan Cover Sheet

**Work/Activity:** Fish Sampling and Processing for the Foodstuffs Monitoring Program

**Identification Number:** LANL-RRES-ECO-SF-HCP/OP-002, R4

**Author:**

| Phil Fresquez | | |
|---|---|---|
| Name | Signature | Date |

**Initial Risk Level:** Low

**Consultation** / **Concurrence**

__ Not Required __ Required __ Not Required __ Required

| | | |
|---|---|---|
| Name (ECO Subject-Matter Expert) | Signature (as required) | Date |
| Name (Independent Peer) | Signature (as required) | Date |
| Safety Officer | Signature | Date |
| Team Leader | Signature | Date |

**Residual Risk Level:** Minimal

**Authorization of Work:**

| | | |
|---|---|---|
| Group or Deputy Group Leader | Signature | Date |

**Next Review Date:**

# Fish Sampling and Processing for the Foodstuffs Monitoring Program

Los Alamos National Laboratory
LANL-RRES-ECO-SF-HCP/OP-002, R4
Approval Date: 04/03

## 1.0 INTRODUCTION

**1.1 Background** A description of the Fish Monitoring Program is provided in the Foodstuffs Monitoring portion of the Environmental Monitoring Plan for 1996–2001 (LA-UR-99-1117).

**1.2 In this Document** This procedure addresses the following major topics:



**1.3 History of Revision** This table lists the revision history and effective dates of this procedure.

| Revision | Date | Description Of Changes |
|---|---|---|
| 0 | 6/28/96 | New document |
| 1 | 3/99 | Reformatted in accordance with LIR300-00-01, Safe Work Practices |
| 2 | 4/01 | Added new Section 9.0, Training |
| 3 | 4/02 | Added new text regarding electrofishing procedures. |
| 4 | 4/3 | Team name change to Environmental Surveillance. |

## 2.0 PURPOSE

This Environmental Surveillance Team procedure describes the process for collecting and preparing fish as part of the Foodstuffs Monitoring Program, as mandated by DOE Order 5400.1, 5400.5.

## 3.0 SCOPE

This procedure applies to the individual assigned to collect fish as part of the Foodstuffs Monitoring Program—Phil Fresquez for radionuclides and mercury monitoring and Gil Gonzales for organic monitoring.

## 4.0 DEFINITIONS

**4.1 Terms**

Foodstuffs: produce (fruits, vegetables, and grains), fish (surface feeders and bottom feeders), eggs, milk, brewed tea, honey, and game animals (i.e., deer and elk).

## 5.0 RESPONSIBILITIES

**5.1 Principal Investigator**

Principal investigators (PIs) are responsible for

- Defining the components of and the processes associated with the work in sufficient detail to enable hazards to be identified and adequately controlled;
- Determining required training for workers;
- Ensuring that assigned workers are trained and meet authorization to work standards; and
- Ensuring that workers have the knowledge, skills, and abilities needed to perform the work safely.

**5.2 Workers**

Workers, with assistance as needed, are responsible for

- Identifying and evaluating the hazards associated with the work, as necessary, to ensure that the controls are adequate to perform the work safely;
- Defining, establishing, and maintaining, as assigned, a hazard-control system that effectively mitigates the hazards associated with the work and meets institutional and facility requirements;
- Determining that the work has been authorized before proceeding with it;
- Acquiring the knowledge and skills needed to perform the work;
- Obtaining and maintaining authorization to perform the work;
- Understanding and following all operational requirements and restrictions related to the work;
- Performing the work safely;
- Improving the safety of the work by reviewing the work, commensurate with the level of risk, and incorporating lessons learned;
- Using an appropriate change-control process to document and communicate changes made in the hazard control system; and
- Stopping the work if it seems to be unsafe.

**5.3 Line Managers/ Supervisors**

Line managers/supervisors are responsible for

- Defining the scope of work;
- Ensuring that an effective hazard-control system is established to reduce the risk posed by the work to an acceptable level;
- A periodic review of the process used to assign and mitigate initial risk;
- Ensuring that institutional and facility requirements and restrictions on the work are followed;
- Authorizing the defined work, when the risk has been controlled to an acceptable level;

## 5.0 RESPONSIBILITIES

**5.3 Line Managers/ Supervisors (cont.)**

Line managers/supervisors are responsible for (cont.)

- Authorizing workers to perform the work, after they have documented adequate knowledge, skills, and abilities;
- Ensuring that workers perform the work safely;
- Improving the safety of the work by reviewing the work, commensurate with the level of risk, and ensuring the incorporation of lessons learned; and
- Ensuring that an appropriate change-control process is used to document and communicate changes made in the hazard-control system.

**5.4 Subject Matter Experts**

Not applicable to the procedures described in this document.

## 6.0 PRECAUTIONS AND LIMITATIONS

This document establishes the basic requirements for collecting fish samples for the Environmental Monitoring Program. This procedure applies to all personnel performing field procedures described in this document. Work performed under this procedure by LANL personnel will occur only after all other applicable procedures have been reviewed and signed as listed under Section 7.0 of this document.

## 7.0 SAFE WORK PRACTICE REQUIREMENTS

**7.1 Define the Work: Collection of Samples**

Project Personnel - In accordance with the procedure for field work, a minimum of two people is required to go out in the field.

Sample Types - Two categories of fish are collected:

- predator feeders: rainbow trout, brown trout, kokanee salmon, largemouth and smallmouth bass, white crappie, and walleye.
- bottom feeders: white sucker, channel catfish, carp, and carp suckers.

Sample Locations - Fish samples, both game and non-game, are collected at two types of sites with respect to Los Alamos National Laboratory:

- upstream: a combination of fish from Abiquiu dam, Heron dam, or El Vado dam.
- downstream: Cochiti Lake

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Number of Samples - The following table lists the approximate number of composite fish samples to be collected at upstream and downstream locations:

## 7.0 SAFE WORK PRACTICE REQUIREMENTS (cont.)

| | Upstream Heron, El Vado, or Abiquiu Dams | Downstream Cochiti Lake |
|---|---|---|
| | **For Radiochemical Analysis** | |
| **Game Fish** | 5 to 10 | 5 to 10 |
| **Non-Game Fish** | 5 to 10 | 5 to 10 |
| | **For Mercury Analysis** | |
| **Game Fish** | 3 to 5 | 3 to 5 |
| **Non-Game Fish** | 3 to 5 | 3 to 5 |
| | **For Organics Analysis** | |
| **Game Fish** | variable | variable |
| **Non-Game Fish** | variable | variable |

**Collection of Samples (cont.)**

Equipment Needed - Additional specific equipment needed for going on the lake with the boat is given in the operating procedure for boat and rafts.

The following equipment is needed for fish sampling:

- first-aid kit
- cellular telephone and/or radio
- ice chest
- ice
- zip-lock sample bags (gallon size)
- marker for labeling bags
- fishing equipment (gill nets, rods-and-reels)
- chain-of-custody forms (see procedure LANL-RRES-ECO-HCP/OP-SF-008, R1 and Attachment 1)

Sampling Fish - In late spring/early summer, travel to the sampling locations at Cochiti and at least one of the upstream lakes to collect fish for analysis. At each lake, perform the following steps:

| Step | Action |
|---|---|
| 1 | Follow the procedure governing general field work, including: identifying a Point-of-Contact (providing pertinent information of destination, expected time-in, and how to notify field team), notifying main office if leaving Los Alamos County, and checking conditions of vehicle, trailer, and boat for safe operation. |
| 2 | Follow the procedure governing operations of the boat and for boat and water safety. |
| 3 | Use either electrofishing or gill nets to harvest the fish.<br>When using gill nets, the following procedures should be used:<br>• Identify several sampling locations where nets can be set perpendicular to the current.<br>• At each location, anchor one end of the net to a fixed point (e.g., a partially submerged tree) and stretch the net perpendicular to the prevailing current. At the other end of the net, attach a weight to the bottom of the net and a float to the top of the net. This float-weight |

| | |
|---|---|
| | system is effective for maintaining proper positioning of the net. |

## 7.0 SAFE WORK PRACTICE REQUIREMENTS (cont.)

| Step | Action |
|---|---|
| 3 (cont.) | Use either electrofishing or gill nets to harvest the fish.<br>When using gill nets, the following procedures should be used (cont.):<br>• Return no more than 24 hours later to the net location; carefully raise the net from the water (avoid entangling the net), and remove fish from the net.<br>• Remember to clean the net and neatly roll it for storage after returning from the field.<br>When electrofishing, follow procedures specified in Attachment 2, "Protocol: I. Electroshock Sampling, Processing, and Submitting Fish for Organics Analysis." |
| 4 | Collect about 5 to 8 kg (11 to 18 lbs. fresh weight) of each species. |
| 5 | Place the fish in large, labeled plastic bags, pack the fish on ice, and transport back to the Laboratory. |
| 6 | Complete a chain-of-custody form with the appropriate sampling information. |

Storing the Fish – Plan to process the fish within two working days. Store the fish on ice or in a freezer until they are processed.

**Processing of Samples**

Equipment Needed – The following equipment will be needed for processing the fish:
- drying oven
- ashing oven
- rubber gloves
- bleach
- knives
- balance
- glass beakers (50mL, 1L, and 2L volumes)
- polyethylene bottles (20ml and 500mL volumes)
- aluminum foil
- plastic wrap
- ice cubes
- hot plate
- zip-lock bags
- labeling pen
- chain-of-custody tape

## 7.0 SAFE WORK PRACTICE REQUIREMENTS (cont.)

**Processing of Samples (cont.)**

Sample Processing - Within two days of collection, process the samples by following the steps below:

| Step | Action |
|---|---|
| 1 | Separate the fish by species. Clean the fish as though being prepared for human consumption. Remove viscera, and discard; remove head, tails, and fins and place them in a 1-liter beaker to be used later for analysis of tritium content (prepare approximately 10 beakers for each lake sampled). Cover beaker with plastic wrap and refrigerate until used for tritium collection. Do not fillet (remove bones) because some consumers may use them for fish meal, and the efficiency of bone removal varies among individual preparers. |
| 2 | To obtain the tritium samples, prepare the setup under the hood as shown in Attachment 3. Begin by placing a 50-mL beaker upside-down in the sample beaker (filled with fish heads, tails, and fins), and a 50-mL beaker right-side-up on top of it. Cover the top of the large beaker with an evaporating dish and seal with plastic wrap. To aid in condensation of the water-sample, fill a beaker with ice and place it on top of the evaporating dish. Place the sample on a hot plate, warming at a low temperature until water begins to condense on the evaporating dish. Be certain that the condensation drips into the 50-mL sampling beaker. Collect about 5 to 10 mL of distillate from each sample, carefully place sample into individually labeled 20-mL polyethylene bottles. Seal each bottle with properly identified chain-of-custody tape, and record each sample on the appropriate chain-of-custody form. Place all tritium samples and the chain-of-custody form into a labeled zip-lock bag and refrigerate until samples are submitted to an analytical laboratory for analysis. At present, we are employing Paragon Analytics, Inc., Fort Collins, CO. |
| 3 | To obtain samples for mercury analysis, meat from 5 fish must be removed and labeled for analysis. After cleaning and rinsing the fish with double-distilled water, remove a 10-g (fresh weight) sample of meat from the individual fish. Place samples into individually labeled zip-lock plastic bags, record all samples on a chain-of-custody form, and then place all samples for heavy metals into a properly labeled zip-lock bag and freeze until submitted to Paragon Analytics, Inc. |
| 4 | All remaining samples, except for fish meant for organics analysis, will be used for radiochemistry analysis. Place approximately 500 to 1000 g of fish into labeled 2-L tared beakers and weigh to the nearest 0.01 g to determine fresh weight. Record the tared beaker weight and fresh weight (subtract the |

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|---|---|
| | tared-weight from the gross weight) of the fish in the laboratory notebook. Each beaker may contain from 1 to 15 fish to constitute the sample. If possible, split a large fish (*e.g.*, catfish) into two beakers to serve as replicates for analysis. |
| 5 | Cover each beaker with vented aluminum foil and place in the drying oven, carefully noting the placement-order of the beakers in the lab notebook. |
| 6 | Dry the fish in the beakers at about 80°C for 5 days |

## 7.0 SAFE WORK PRACTICE REQUIREMENTS (cont.)

**Processing of Samples (cont.)**

Sample Processing - Within two days of collection, process the samples by following the steps below (cont.):

| Step | Action |
|---|---|
| 7 | After the 5 days, reweigh the beakers to the nearest 0.01 g every day. Continue drying until sample weights are constant (±10%) in two successive weighings. |
| 8 | Subtract tare weights from the gross weight to calculate the dry weight of each fish sample. Enter this data in the laboratory notebook. |
| 9 | After determination of dry weight, place samples in the ashing oven, carefully noting placement of beakers, and ash the fish samples for 5 days. During ashing, raise the temperature step-wise from 200°C to 500°C to avoid explosive combustion of the organic materials in the early stages of the process. Ashing occurs at about 450°C as all traces of charred organic material disappear from the samples. |
| 10 | After ashing is complete, reweigh the samples to 0.01 g. |
| 11 | Calculate ash weights by subtracting tare weights from gross ash-weights. Record this weight in the lab notebook. |
| 12 | Transfer each ash sample to a 500-mL polyethylene bottle and label the bottle appropriately. Seal the bottles with chain-of-custody tape and record samples on a chain-of-custody form. Place all samples in a labeled zip-lock bag to be turned over to Paragon Analytics, Inc., with the appropriate chain-of-custody form. |
| 13 | Wipe the beakers clean and reweigh them to the nearest 0.01 g in order to recheck the tare weights. |
| 14 | Clean the table top with soap and water after the dissecting of the game tissue. Follow with diluted bleach to ensure (pathogen) contamination control. |
| 15 | To obtain, process, and submit samples for organics analysis, follow the |

procedures in "Protocol: I. Electroshock Sampling, Processing, and Submitting Fish for Organics Analysis."

## 7.0 SAFE WORK PRACTICE REQUIREMENTS (cont.)

**Submittal of Samples**

Submitting the Samples - Submit all samples (liquid, frozen, and ashed) to Paragon Analytics, Inc., for heavy metal and radiochemical analyses. For each location, samples from approximately 1 to 3 individual fish are submitted for heavy metal analysis, and about 5 to 10 g of ash from each sample are submitted for analysis. Also, approximately 10 liquid samples (5 to 10 mL each) are submitted for tritium analysis.

When submitting samples to Paragon Analytics, Inc., be sure to follow proper chain-of-custody procedures, as outlined in LANL-RRES-ECO-HCP/OP-SF-008, R1 "Chain-of-Custody for Environmental Samples." This includes, but is not limited to, retaining the samples in a secured manner and presenting the proper chain-of-custody form to be signed by a Paragon Analytics, Inc., representative as samples are submitted.

Request the following analyses:

- analysis of tritium content in liquid samples
- analysis of the following heavy metals from frozen samples: Ag, As, Cd, Cr, Hg, Pb and Zn
- analyses of the following radionuclides from ashed samples: strontium-90, cesium-137, uranium, plutonium-238, plutonium-239/240, and americium-241.

Organics Analysis - Submit samples for organics analysis according to "Protocol: I. Electroshock Sampling, Processing, and Submitting Fish for Organics Analysis."

### 7.2 Identify and Evaluate Hazards

| Hazard | Initial Risk Level based on Severity and Likelihood |
|---|---|
| *In the Field:* | |
| A) Off-road automobile accidents and tripping or falling hazards | LOW |
| B) Blood-borne pathogens (plague, hantavirus, ticks, etc.) | LOW |
| C) Environmental hazards (weather) | LOW |
| D) Lifting and moving heavy items | LOW |
| *In the Laboratory* | |
| E) Use of electrical appliances (hot plates and ovens) | LOW |
| F) Hot and/or broken glass | LOW |
| G) Splattering of hot water | LOW |
| H) Drying and ashing ovens | LOW |
| I) The Wiley Mill | LOW |
| J) Use of knives | LOW |
| K) Repetitive motion and other ergonomic hazards | LOW |

## 7.0 SAFE WORK PRACTICE REQUIREMENTS (cont.)

### 7.3 Develop and Implement Controls

#### 7.3.1 Development

| Hazard | Hazard Control | Residual Risk Level |
|---|---|---|
| A Off-road automobile accidents and tripping or falling hazards | LANL personnel will follow operating procedures discussing off-road vehicle use and tripping or falling hazards. Appropriate footgear and clothing will be worn by all LANL personnel. Personnel will have first aid/CPR training. Refer to General Field Work HCP/OP. | MINIMAL |

| | | |
|---|---|---|
| B Blood-borne pathogens (plague, hantavirus, ticks, etc.) | In accordance with recommendations set by the State of New Mexico Environmental Department, all personnel should wear long pants, long-sleeved shirts, and insect repellent. Do not handle dead or sick rodents. When you have returned from the field, perform a self-check for the presence of ticks. Refer to General Field Work HCP/OP. | MINIMAL |
| C Environmental hazards (weather) | LANL personnel will cease operations during inclement weather as described in RRES-ECO operating procedures for conducting general fieldwork. All work will be performed within a safe distance to vehicles. The distance will be based on current field conditions and terrain with respect to current and expected weather conditions. Refer to General Field Work HCP/OP. | MINIMAL |
| D Lifting and moving heavy items | Use carts and dollies. Use a helper. | MINIMAL |
| E Use of electrical appliances (hot plates and ovens) | Wear safety glasses, lab coat, steel-toe safety shoes, and rubber gloves. Be familiar with the operator's manuals for each piece of equipment. | MINIMAL |
| F Hot and/or broken glass | Wear safety glasses, lab coat, steel-toe safety shoes, and rubber gloves. | MINIMAL |
| G Splattering of hot water | Wear safety glasses, lab coat, steel-toe safety shoes, and rubber gloves. | MINIMAL |

## 7.0 SAFE WORK PRACTICE REQUIREMENTS (cont.)

**7.3.1 Development (cont.)**

| **Hazard** | **Hazard Control** | **Residual Risk Level** |
|---|---|---|
| H Drying and ashing ovens | Use hot-mitts or pot holders when working with the ovens, hot plates, or hot beakers. | MINIMAL |
| I The Wiley Mill | Wear safety glasses, lab coat, steel-toe safety shoes, and rubber gloves. Be familiar with the operator's manuals for each piece of equipment. | MINIMAL |

| | | |
|---|---|---|
| J Use of knives | When knives are being used, cut-resistant gloves should be worn to prevent injuries. | MINIMAL |
| K Repetitive motion and other ergonomic hazards | Take a short break every hour. | MINIMAL |

**7.3.2 Documentation**

All personnel assigned to participate in fish sampling will have read this hazard control plan/operating procedure and will have signed an acknowledgment (Attachment 4).

Any future changes to this operating procedure will be properly documented and will be reflected by the revision number that is included with the document identification number.

**7.3.3 Authorization of Work**

All LANL workers involved with this activity will obtain authorization from their direct supervisor, group leader, or deputy group leader. No work will be performed until this authorization has been granted. The residual risk level for performing activities related to this activity have been determined based on consultation with subject matter experts including contractor personnel and LANL personnel experienced in this type of procedure.

All work related to this activity will be reviewed, at a minimum, on an annual basis, and this document updated to reflect changes as deemed necessary.

**7.3.4 Authorization of Workers**

LANL workers will be granted authorization to perform this work only after they have reviewed all appropriate required documentation and training that applies to LANL personnel. All contractor personnel will perform this work only after they have provided proof of appropriate documentation that applies to contractor responsibilities.

**7.4 Perform Work Safely**

All personnel involved with this activity will adhere to all safety guidelines and procedures as described in the appropriate documents, including this document. Contractor personnel will be responsible for ensuring self-readiness checks before performing the work. LANL personnel will perform self-readiness checks before performing fieldwork. Field conditions, including weather conditions, will be evaluated as to the effect they will have on performing field activities safely. If activities can not be performed safely, all activities will cease until such time the LANL project leader authorizes work to resume.

## 7.0 SAFE WORK PRACTICE REQUIREMENTS (cont.)

**7.5 Provide Feedback and Continuous Improvement**

At a minimum, the activity described in this document will be evaluated annually. If any changes are made to the procedure, those changes will be evaluated as to whether or not they may introduce new hazards. Any new hazards will be evaluated and appropriate controls implemented to reduce their risk to an acceptable level. A periodic review with project personnel will be made to evaluate the accuracy of this document with respect to field operations.

## 8.0 RISK DETERMINATION

The determination of risk for each activity described in this document was based on the Risk Determination matrix given in LIR300-00-01, Safe Work Practices.

## 9.0 TRAINING

The following training must be completed and confirmed by the PI of the project before work can begin:

For each worker:

- General Field Work HCP/OP (LANL-RRES-ECO-SOP-001) must be read and documented.
- Thermal Stress Awareness Training must be taken when it becomes available

For each field crew:

- At least two people must have current First Aid Training.
- At least two people must have current CPR Training.
- Members must have site-specific training as required by the location where work is occurring.

## 10.0 REFERENCES

**10.1 Source Documents**

The following documents, which can be found in the Team Leaders (Phil Fresquez) Office located at TA-21, Building 210, Room 222, are referenced in this procedure:

(Due to current revisions, some document numbers may change)

- LAUR-99-1117, "Environmental Monitoring Plan"
- LANL-RRES-ECO-HCP/OP-SF-008, "Chain-of-custody for Environmental Samples"
- LANL-RRES-ECO-HCP/OP-001, "General Field Work"
- LANL-RRES-ECO-HCP/OP-SF-010, "Boat/Raft and Water Safety."
- "Protocol: I. Electroshock Sampling, Processing, and Submitting Fish for Organics Analysis" (Attachment 2).

**10.2 Document Coordination**

RRES-ECO (Ecology Group) of the Risk Reduction and Environmental Stewardship Division is the group of institutional coordination responsible for developing, revising, and maintaining the contents of this document.

ATTACHMENT 1: CHAIN-OF-CUSTODY RECORD

Attachment 1

Los Alamos

## ATTACHMENT 2:
## Protocol

**I. Electroshock Sampling, Processing, and Submitting Fish for Organics Analysis;**
**II. Organics Data Management and Quality Assurance.**

### I. Electroshock Sampling, Processing, and Submitting Fish for Organics Analysis
**Boating/Electroshocking**

Collection of samples for chemical analyses follows a set procedure to ensure proper collection, processing, submittal, and posting of analytical results. Stations and samples have unique identifiers to provide chain-of-custody control from the time of collection through analysis and reporting.

### A. Electrofishing

Related Requirements, Permissions, etc.: IACUC Protocol 97-59-02R; NM Dept. Game & Fish Permit 2864; LANL-RRES-ECO-20-HCP/OP-001, R2 (General Field Work); LANL-RRES-ECO-20-SF-HCP/OP-010, R2 (Boat/Raft and Water Safety); LANL-RRES-ECO-20-SF-HCP/OP-008, R2 (Chain of Custody for Environmental Samples).

A boat electrofishing crew consists of a driver and one or two persons who collect the fish with dip nets. The driver should be skilled at maneuvering the boat as effectively as possible to allow crew members the best opportunity to capture stunned fish. As with wadeable electrofishing methods, all members of the boat electrofishing crew wear polarized sunglasses.

RRES-ECO's SR-17 Electrofishing Cataraft is 17 ft. and powered by a 25 hp outboard motor. The boat has a hard deck to provide a secure working platform, and a soft hull (inflatable pontoons) allows for solid hits without damage. The self bailing features ensures a buoyant platform regardless of water taken over the deck. The pontoons increase stability. The boat can be rowed with oars.

Air pressure of the pontoons should be at ~ 2-1/2 psi working pressure.

Launching Instructions:

All safety equipment inspected and accounted for.
Remove the tie downs the boat.
Operator puts on approved life vests.
An operator should be in the boat to back it off the trailer.
Back the trailer down the ramp until the trailer bunks are under the water.
Start the outboard motor and allow to warm up.
Unhook the safety chain from the bow of the boat.
Remove the winch hook from the bow of the boat
Shift the outboard engine into reverse and power off the trailer.
If the boat will not back off the trailer, backing further into the water may be necessary.

Boom electrode deployment:

Move the booms to the upper travel supports.
Connect the safety snaps to the eye on the end of each boom.
Snap the electrode array on the end of the boom.
Check to be sure the electrode array is secure to the boom.
Expand the array by loosening the nut on the center of the array and sliding the center until the array is fully expanded, tighten the nut to lock the array in position.
Walk to the forward end of the boom.
Loosen the boom clutch by turning the large nut with spokes counter-clockwise with your foot.
Move the boom forward until pointing nearly straight-ahead using the chain attached to the boom.
Tighten the boom clutch by turning the large nut clockwise with your foot.
Adjust the depth of the electrodes by placing the chain on the boom into the notch on the handrail.

The exposed cables on the electrode array should be completely under water.
Move the booms back into the upper travel supports and collapse the electrode array, before high-speed travel.

Water conductivity also influences the response of the fish to the electrical field and is the single most important limiting factor in electrofishing effectiveness. Low-conductivity water is highly resistant to the flow of electrical current, thereby reducing the amount of electrical current traveling through the water and passing through the body of the fish. Under such conditions the electrical field is limited to the immediate area of the electrode. Thus, a relatively high output voltage is required to create an electrical field of sufficient size and strength to stun fish. High-conductivity water produces the opposite effect by concentrating a narrow electrical field between the electrodes. In high-conductivity water, output voltage must be reduced to minimize potential damage to the fish. Most electrofishing equipment is designed to operate in water with conductivity ranging from 20 to 2,000 microsiemens per centimeter, and is usually capable of generating output voltages of 100 to 1,000 volts. An electrical field strength meter is used to determine the size and strength of the electrical field generated by the electrofishing equipment. The conductivity of the water must be measured prior to electrofishing to determine the appropriate output voltage for effective electrofishing. The Rio Grande has water conductivity ranges from 365 to 619 microsiemens per centimeter, (LA-13343-ENV ) 1996. from Cochiti Lake to Frijoles Canyon.

Sampling begins at the upstream boundary of the sampling reach proceeding in a downstream direction by maneuvering the boat along one shoreline. The shoreline sampled during the first pass is decided at random. The boat is operated at a speed equal to or slightly greater than the water velocity. Sampling is conducted in a downstream direction because fish are usually oriented into the direction of the flow and therefore either swim into the approaching electrical field or turn to escape downstream. Turning to escape orients the fish perpendicular to the electrical field, exposing a greater surface area of the fish to the electrical field and thus making the fish more susceptible to the electrical field. Also, when fish are stunned they are carried downstream by the flow, providing greater opportunity for capture. Thus, when sampling with an electrofishing boat, sampling in a downstream direction is more efficient than sampling in an upstream direction.

The following guidelines will be followed by all staff, in order to minimize injury and mortality to fishes when utilizing the Electrofishing technique. In general when using this technique one should use the lowest practical settings for voltage and frequency while minimizing the time that the fish are exposed to the electrical field.

Direct current (DC) will be used whenever possible. It causes fewer and less severe injuries than alternating current (AC). Only when DC is not effective, even at high voltages, should you switch to AC setting.

**Field crews should start at a low voltage (150v) and a low frequency (30 Hz)**. If ineffective in causing fish to surface, then gradually increase unltil the minimum effective electrical current is achieved.

Fish are more vulnerable to electrical fields at high water temperatures. If fish are to be kept alive for lab purposes or released water temperatures should be monitored. Optimal temperatures for keeping fish alive are ~20.0°C for cold water species and ~30.0°C for cool or warm water species.

Only techs or staff members trained in the use of Electrofishing gear should be allowed to perform this technique in the field. Inexperienced persons will be allowed to utilize this technique in the field only when accompanied by someone who is experienced and qualified, and who can teach them on how to use the gear proficiently and safely.

Night electrofishing studies have shown that night sampling, particularly in nonwadeable waters, can yield more species and greater numbers of individuals than day sampling (Loeb, 1957; Paragamian, 1989). This is due to a variety of factors including reduced gear avoidance at night and diurnal movements of fish. Night electrofishing of nonwadeable streams has been suggested to provide a more representative sample of fish community structure, and therefore has been recommended for long-term monitoring programs that include large rivers (Sanders, 1992). Night sampling, however, can produce undue fatigue and additional safety risks, and should be avoided if satisfactory results can be obtained during day sampling.

Dip nets must be made of nonconducting material (fiberglass, polyvinyl chloride tubing, or nylon), and aluminum dip nets must not be used. All crew members must wear rubber gloves and waders. Rubber gloves should cover the forearm for maximum protection. Chest waders with nonslip soles should be worn when using wadeable methods. Hip boots or tennis shoes are preferable when boat electrofishing. Gloves and waders should be inspected for leaks before entering the water.

Safety guidelines must be followed to ensure safe operation of electrofishing gear. These guidelines include important rules for field operations, such as (1) leaving the water immediately if waders or gloves develop leaks; (2) avoiding operation of electrofishing equipment near people, pets, livestock, or wildlife that are in or near the water; (3) ceasing operations in inclement weather (moderate to heavy rain, lightning, or thunderstorms); (4) resting often to avoid fatigue; (5) making all electrical connections or disconnections while the unit is turned off; and (6) refueling generators with equipment turned off and when surfaces have cooled.

Most importantly, all crew members should be alert and conscious of potential hazards, act in a professional manner, and use common sense.

## ELECTROFISHING FIELD SAFETY CHECKLIST

**Electrical Equipment**

- ☐ Electrical connections secure and protected
- ☐ Gages and wiring in proper working condition
- ☐ "Deadman switch" in operating condition
- ☐ Anodes in good condition; attached to handles securely [wadeable streams]

**Ancillary Equipment**

- ☐ Fire extinguisher - fully charged
- ☐ First-aid kit present
- ☐ Dip net handles constructed of nonconductive material

**Crew Members**

- ☐ Trained in electrofishing operation
- ☐ Wearing rubber gloves (inspected for leaks)
- ☐ Wearing chest waders (inspected for leaks) with nonslip soles [wadeable streams]
- ☐ Wearing hip boots (inspected for leaks) [nonwadeable streams]

| ______________________ | ______________ |
| --- | --- |
| Signature | Date |

**B. Sampling/Processing**

1) Fill C-O-C and photograph each site using digital camera.
2) Sample the specified number of fish for each of the specified species from each of the specified sample locations, keeping the largest fish (minimum 35g fwt).

| Date | Sample No. | Site | GPS Location | Species | Weight | Length | Girth |
|---|---|---|---|---|---|---|---|
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If partitioned, place viscera into labeled amber screw-top jars. Place whole fish into pre-labeled glass containers. [Cut fish in half or smaller portions if necessary to fit into glass). Place samples into ice-filled chest. Keep samples cool or frozen and in the dark until submittal.

Return samples to lab; rinse, weigh, etc.

Gut and separate viscera (organs, fatty deposit). If necessary, combine subsamples of viscera to meet minimum sample quantity requirement. Weigh.

Whole Fish: Do not skin and leave head and tail attached. Weigh.

For submittal, package into insulated, cooled shipping containers.

Submit overnight to Paragon Analytical in Ft. Collins, CO, w/copies of C-O-C and Purchase Request.

Sampler: ____________________________ Date: _______________

## C. Submitting

**Axys Analytical Services in Canada**

Establish Chain-of-Custody when samples are collected.

**Day Before Submittal**
Fill Other Forms

1) Shipping Request (If dry ice is used, note the approximate quantity of dry ice in each container).
2) Import Requirement (Customs) Form: Axys provides us with a one-sheet form that has codes specific to each animal class.
3) Commercial Invoice
4) Complete Chain of Custody

It's essential that on page 3 of the Shipping Request, in the 'Repair Statement' you indicate that we'd like Shipping and Receiving to put the following statement on the Fed-Ex package: "Nonhazardous Materials, Not For Human Consumption, For Laboratory Analysis Only"!

Submit to Gil for review.

Call Joy Torres (5-2194) of BUS-6 to get her OK.

If dry ice is going to be used, arrange for dry ice pick-up.

**Morning of Submittal to Shipping and Receiving**
Make a copy of the paperwork being submitted with the samples for Gil.

Pack samples in cooler with dry ice or "blue ice" (if dry ice, the cooler should not seal extremely tightly. If possible use styrofoam coolers for dry ice.)

Submit specifically to Scott Allen at Shipping and Receiving, no later than 10:00 a.m. (preferably by 8:30) and no later in the week than Wednesday. (Don't let the other guys handle it; Scott Allen is the person).

- Witness the following statement being put on the outermost (Fed-Ex) package: "Nonhazardous Materials, Not For Human Consumption, For Laboratory Analysis Only"!
- Get the waybill (also called airbill) number.

FAX a copy of all completed forms to Joy Torres of BUS-6 at FAX: 7-3195.
E-mail analytical@axys.com letting them know the waybill (airbill) number, the number of coolers that were shipped, and their general contents.

## II. Data Management and Quality Assurance

The RRES-ECO operating procedure for organics data quality assurance/quality control (QA/QC) protocols, including chemical analyses, data handling, validation, and tabulation information are in development. PCB analysis QC is described in detail in "Statement of Qualifications to Conduct Organic Analyses, (April). Sidney, British Columbia, Canada," (Axys Analytical Services, Ltd., 1999), which is summarized below.

### *SUMMARY OF NONFOODSTUFFS BIOTA DATA ACQUISITION, VALIDATION/VERIFICATION, AND MANAGEMENT*

| Routine Samples | Analyte(s) | Lab | Method | DL | Data Receipt | Analytical Verification/QC* |
|---|---|---|---|---|---|---|
| • Fish | Organics<br>- PCB Congener<br>- Organochlorine pesticides<br>- Dioxin/Furan | Axys | GC/HRMS | Ppb – ppt | Electronic & Hard | Procedural Blank, Sample Duplicate, QA-QC-2 Method Validation, Reference Samples, Spiked Blank, Unspiked Matrix, Matrix Spike/Duplicate, Instrument QC Checks. Blank, Low level check solution; ICB, CCV, Readback. NIST-traceable standards |
| ***SPECIAL STUDY SAMPLES*** | | | | | | |
| • Wood & Veg | Rad | Paragon | Ref. Foodstuffs | Ref. Foodstuffs | Electronic & Hard | Ref. Foodstuffs |
| | Metal | Paragon | SW-846, 3$^{rd}$ Ed, Trace ICP/6010B/PAI SOP 807R5 | PRL: low ppm; MDL/IDL: ppb | Electronic & Hard | 1. Blank & Lab Control.<br>2. Prep blank compared to PQL<br>3. Lab control compared against accept limits<br>4. Blanks compared against PQLs<br>5. Calibration verifications compared to acceptance criteria<br>6. Interference check samples and stnd readbacks compared to acceptance criteria<br>7. Matrix spikes and duplicates digested and analyzed |
| • Amphibian/Reptile | Organics | | | | | |
| • Small Mammal | Organics and Rad | | | | | |
| • Other (e.g. arthropods, avian, etc.) | Study-specific | | | | | |

*Complete Statement of Qualifications available for Paragon Analytics, Inc. and Axys Analytical Services, Ltd.

- **Data Verification:** Verifier certifies entry, transcription, and operation. Additional verification via RRES-ECO "Manuscript Approval and Author Checklist" of RRES-ECO "Research Policy, Process, and Guidelines."
- **Data Management:** Archived by year, matrix, location. ECORSK.6 data in MS Access.

**Data Validation:** Models are tested against real data or another model. Level four analytical lab QC are requested for correctness and compliance with standards. RRES-ECO is attempting to adopt ER-SOP-15.03 ("Routine Validation of Organochlorine Pesticides and Polychlorinated Biphenyls Data") as summarized below.

## DATA VALIDATION COVER SHEET

### Section I.

Request Number: ____________ Validation Date: ____________ Lab Code: ____________

Contract Laboratory Name: ____________

Validator: ____________ Organization: ____________

Analytical Suite (check all that apply):
- ☐ Volatile Organics
- ☐ Semivolatile Organics
- ☐ Organochlorine Pesticides/Polychlorinated Biphenyls
- ☐ High Explosives
- ☐ Inorganics
- ☐ Radiochemistry

Other (describe): ____________

### Section II. Completeness Check

| Yes | No | n/a | (check one) | Yes | No | n/a | (check one) |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | 1. Chain-of-custody form(s) | ☐ | ☐ | ☐ | 6. Raw/BSS data |
| ☐ | ☐ | ☐ | 2. Case narrative | ☐ | ☐ | ☐ | 7. Quality control forms |
| ☐ | ☐ | ☐ | 3. Sample result forms | ☐ | ☐ | ☐ | 8. Quantitation reports |
| ☐ | ☐ | ☐ | 4. Sample chromatograms | ☐ | ☐ | ☐ | 9. TICs forms |
| ☐ | ☐ | ☐ | 5. Standard chromatograms | ☐ | ☐ | ☐ | 10. TICs mass spectra |

Identify any samples in the assigned Request Number that are missing:

________ ________ ________ ________ ________ ________ ________ ________

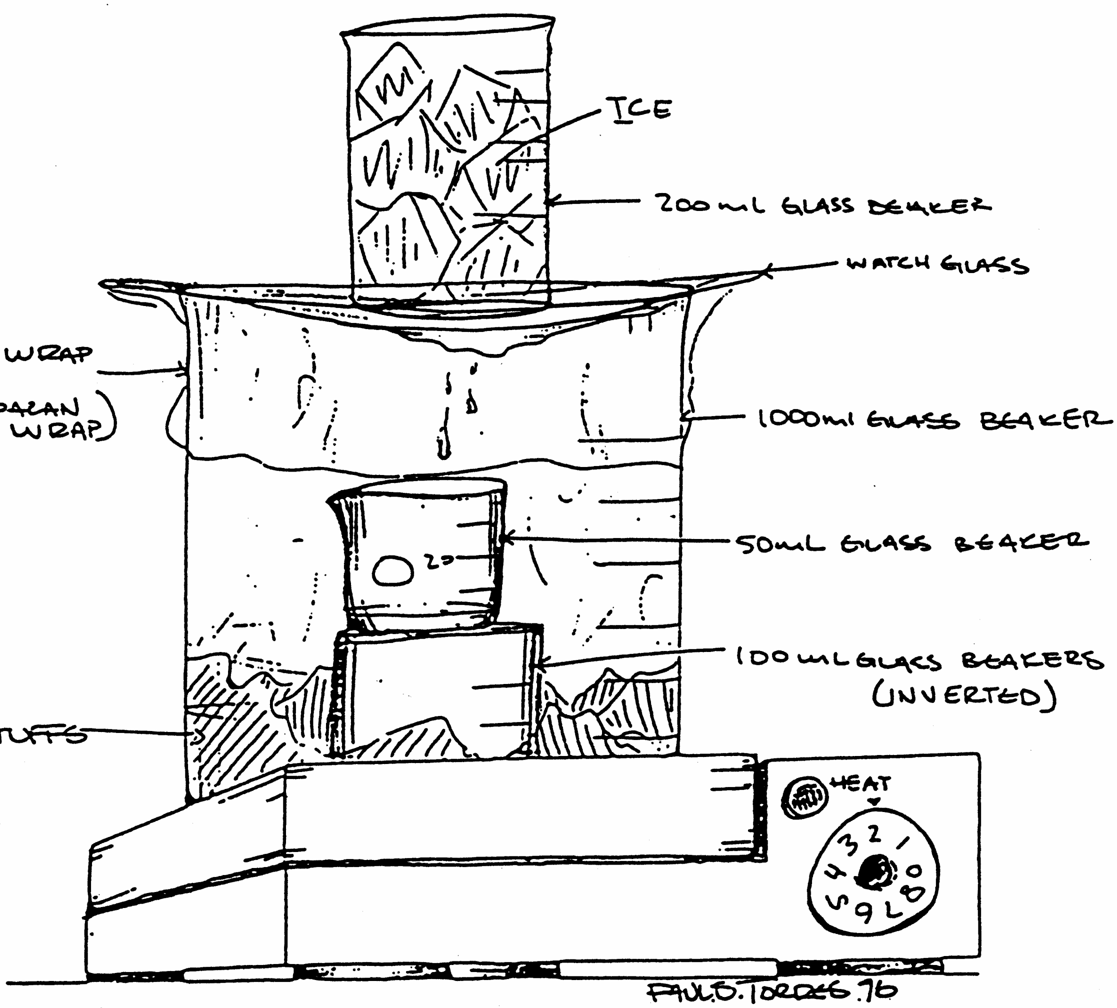
________ ________ ________ ________ ________ ________ ________ ________

Comments/problems noted (include information about requests for further information submitted to the contract laboratory and agreed upon date of resolution and contract laboratory point of contact): (Attach additional comment sheets as necessary)

Validator's signature: ____________ Date: ____________

| ER-SOP-15.0 | | | | Los Alamos<br>Environmental Restoration Project | |
|---|---|---|---|---|---|
| **Section II. GC QC Checklist** | | | | | |
| | | | | **Assign qualifier listed below if criteria = Yes** | |
| **Yes** | **No** | **n/a** | (check one) | Detected analyte | Undetected analyte |
| ☐ | ☐ | ☐ | 1. Breakdown performance check not present | R, P10b | R, P10b |
| ☐ | ☐ | ☐ | 2. Breakdown performance exceeds criteria for individual or combined | J, P10 | UJ/R, P10 |
| ☐ | ☐ | ☐ | 3. Breakdown performance exceeds criteria and the associated breakdowns are present in samples | J+, P10a | UJ, P10a |
| ☐ | ☐ | ☐ | 4. Initial calibration not present | R, P16 | R, P16 |
| ☐ | ☐ | ☐ | 5. Initial calibration does not have 5 calibration points and/or low standard at the reporting limit | J, P7 | R, P7 |
| ☐ | ☐ | ☐ | 6. Initial calibration analyte %RSD is greater than 25% or R is < 0.995 | J, P7a | UJ, P7a |
| ☐ | ☐ | ☐ | 6. Continuing calibration verification (CCV) not present or analyzed at proper frequency | R, P16 | R, P16 |
| ☐ | ☐ | ☐ | 7. Continuing calibration analyte %D is greater than 15% | J, P7a | UJ, P7a |
| ☐ | ☐ | ☐ | 8. The retention time (RT) window information is not present | R, P11 | R, P11 |
| ☐ | ☐ | ☐ | 9. The RT window for individual analytes in the CCV have shifted more than 0.05 minutes from the RT window from the initial calibration | __, P11a | __, P11a |
| ☐ | ☐ | ☐ | 10. The analyte reported exceeds the RT window but was confirmed | J, P11b | N/A |
| ☐ | ☐ | ☐ | 11. Preparation/instrument blank is not reported | R, P4b | R, P4b |
| ☐ | ☐ | ☐ | 12. Analyte detected in blank and sample result for analyte < 5x the amount in blank | U, P4 | N/A |
| ☐ | ☐ | ☐ | 13. Analyte detected in PB and sample result for analyte > 5x the amount in PB | J, P4b | N/A |
| ☐ | ☐ | ☐ | 14. The confirmation information is not present for positive results | R, P8a | R, P8a |
| ☐ | ☐ | ☐ | 15. The analyte reported was not confirmed on a second dissimilar column or detector | U, P8 | N/A |
| ☐ | ☐ | ☐ | 16. A multi-component analyte is reported with no standard being analyzed within 72 hours of the initial analysis | J, P7b | N/A |
| ☐ | ☐ | ☐ | 17. The multi-component analyte is reported with no recognizable pattern to the associated standard | J, P7b | N/A |
| ☐ | ☐ | ☐ | 18. The surrogate information is not present | R, P3f | R, P3f |
| ☐ | ☐ | ☐ | 19. The surrogate % recovery > the UAL | J+, P3 | N/A |
| ☐ | ☐ | ☐ | 20. The surrogate % recovery is < LAL but > 10% | J-, P3a | UJ, P3c |
| ☐ | ☐ | ☐ | 21. The surrogate % recovery is < 10% | J-, P3b | R, P3d |
| ☐ | ☐ | ☐ | 22. The surrogate recoveries are (1) < LAL and (1) > UAL | J, P3e | UJ, P3e |
| ☐ | ☐ | ☐ | 23. The Laboratory Control Sample (LCS) information is not present | R, P12 | R, P12 |
| ☐ | ☐ | ☐ | 24. The LCS % recovery is > the UAL | J+, P12d | N/A |
| ☐ | ☐ | ☐ | 25. The LCS % recovery is < LAL but > 10% | J-, P12b | UJ, P12c |
| ☐ | ☐ | ☐ | 26. The LCS % recovery is < 10% | J-, P12a | R, P12a |
| ☐ | ☐ | ☐ | 27. Sample was extracted outside of the appropriate hold time | J-, P9 | UJ, P9 |
| ☐ | ☐ | ☐ | 28. Sample was extracted 2 times the appropriate holding time | R, P9a | R, P9a |
| ☐ | ☐ | ☐ | 29. Sample was analyzed outside the analytical holding time | R, P9b | R, P9b |
| ☐ | ☐ | ☐ | 32. No sample cleanup was performed | __, P13 | __, P13 |
| ☐ | ☐ | ☐ | 33. Sample was broken or lost | R, P15 | R, P15 |

ATTACHMENT 3: SCHEMATIC OF DISTILLATION SETUP
(For processing samples for tritium analysis)



## Attachment 4

## Training Documentation Sheet

## Hazard Control Plan/Operating Procedure for Fish Sampling and Processing for the Foodstuffs Monitoring Program

I, the undersigned, have read and fully understand the Hazard Control Plan/Operating Procedure for fish sampling and processing for the foodstuffs monitoring program.

Signed____________________________________________________Date__________________

Print Name__________________________________________________

Self-Study Training____________________________________________Date___________________
(Supervisor’s signature)

On-the-Job Training____________________________________________Date___________________
(as required) (Supervisor’s signature)